

Bringing Mars Back To Earth

The planet Mars has been mysterious for centuries. But, over the past few decades, a fleet of orbiting and landed spacecraft has greatly advanced our understanding of it.

Based on this knowledge, Mars scientists are now ready to take the next big step: bringing Martian samples back to Earth, where the full power of our terrestrial laboratories could be applied to unlocking the story of the Red Planet's geology, climate, and especially its potential for life – either in the past or even today.

But however you tackle it, returning samples from Mars is definitely a complicated problem. So, how could we actually get a sample from Mars?

One approach is to use a series of three spacecraft, working together like a relay team to deliver samples to Earth.

NASA's next Mars rover, currently in development and planned for launch in 2020, will acquire a set of carefully selected samples of rocks and surface material, and store them in sealed tubes for possible return to Earth.

NASA and the European Space Agency are now working together to explore options for a pair of missions that could take the next steps to bring these samples back.

In one scenario, after the Mars 2020 Rover has placed its collected samples on the Martian surface, a second follow-on mission would land nearby, deploy a small rover to fetch the samples, and bring them back to the lander, where they would be loaded into a container and placed atop a small rocket. The rocket would then lift off, carrying the samples up into Mars orbit.

Waiting in orbit would be a third spacecraft — an Earth Return orbiter — that would find the samples in space, catch up with them, capture the container, and bring it back to Earth.

With Mars samples safely back on Earth, scientists around the world would be able to study them in state-of-the-art laboratories for decades to come.

The payoff of a sample return would be a breakthrough in our understanding of the history of Mars, and of the potential for life beyond our home planet.